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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,742	12/09/2003	Atul Kelkar	502469	5109

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EXAMINER	
OCHOA, JUAN CARLOS	

ART UNIT	PAPER NUMBER
2123	

NOTIFICATION DATE	DELIVERY MODE
09/11/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

RockMail@reinhartlaw.com

Office Action Summary	Application No.	Applicant(s)	
	10/731,742	KELKAR ET AL.	
	Examiner	Art Unit	
	Juan C. Ochoa	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 10–15* is/are rejected.

7)☒ Claim(s) *3-9 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 June 2007* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/6/07*.
4) ☐ Interview Summary (PTO-413). Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed 6/19/07 has been received and considered. Claim 2 is cancelled. Claims 1 and 3–16 are presented for examination.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1 and 10–15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelkar and Joshi, (Kelkar hereinafter), Robust Passification And Control Of Non-Passive Systems, (see IDS dated 12/09/03), taken in view of Son et al., (Son hereinafter), Stabilization Of Linear Systems Via Low-Order Dynamic Output Feedback: A Passification Approach, and further in view of H. R. Pota and A. G. Kelkar, (Pota hereinafter), Modelling And Control Of Acoustic Ducts, (see IDS dated 12/09/03).

6. As to claim 1, Kelkar discloses a method to design a feedback controller for extracting acoustic energy and structural energy in an acoustic enclosure comprising the steps of: obtaining a continuous-time multi-input multi-output (see page 3134, col. 1, 2nd paragraph, lines 10–12) state-space mathematical model (see page 3134, col. 1, 2nd paragraph, lines 1–4) of the acoustic enclosure; and checking passivity of the compensated system (see page 3136, col. 2, 2nd paragraph, lines 1–8). While Kelkar teaches obtaining a continuous-time multi-input multi-output state-space mathematical model of the acoustic enclosure and checking passivity of the compensated system, Kelkar fails to teach designing compensation to render the mathematical model passive. Son teaches designing compensation to render the mathematical model passive in accordance with mathematical system theory if the mathematical model is not passive, thereby forming a compensated system that is passive (see page 3822, col. 2, lines 5–11). Therefore, it would have been obvious to one of ordinary skill in this art at the time

of invention by applicant to utilize the steps of Son in the method of Kelkar because Son renders a linear time-invariant (LTI) system passive and stable via dynamic output feedback (see page 3822, col. 1, lines 1–3), and as a result, Son reports the following improvement over his prior art: dynamic output feedback as passification as well as stabilization that can be solved by using SOF algorithms, e.g. LMI (see page 3826, col. 2, 2nd paragraph).

7. While Kelkar teaches obtaining a continuous-time multi-input multi-output state-space mathematical model of the acoustic enclosure; and checking passivity of the compensated system and Son teaches designing compensation to render the mathematical model passive, Kelkar and Son fail to teach designing a passivity-based controller that extracts at least one of acoustic energy or structural energy such that a resulting closed-loop response provides a desired noise reduction.

8. Pota teaches designing a passivity-based controller that extracts at least one of acoustic energy or structural energy such that a resulting closed-loop response provides a desired noise reduction. (See "The experimental results of a new robust broadband feedback controller, designed using passivity-based techniques, are presented" in page 2, Abstract, lines 5–7; "noise cancelling feedforward controller" in page 6, col. 2, section 4.1 Infinite Dimensional Controller; and "The acceleration to the medium Qa(s) and Qb(s), i.e., the acoustic energy, is provided by speakers attached to one end of the duct and the middle of the duct as shown in Fig. 2." in page 5, col. 1, 2nd paragraph and in Fig. 2).

9. Kelkar, Son, and Pota are analogous art because they are related to active noise control.

10. Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to utilize the controller of Pota in the method of Kelkar and Son because Pota presents a new method to obtain finite dimensional approximations of infinite–dimensional models using quartic functions (see page 2, Abstract, lines 3–4), and as a result, Pota reports a method with an improved accuracy and reduction in computational requirements to obtain finite-dimensional approximation to the infinite-dimensional analytical models (see page , col. , next to last paragraph, lines).

11. As to claim 10, Kelkar discloses a method wherein the step of designing compensation to render the mathematical model passive comprises the steps of: determining if a feedforward compensation will passify the system; if a feedforward compensation will not passify the system: designing a constant gain feedforward compensation to render the compensated system minimum-phase; and rendering the compensated system positive-real by at least one of series compensation, sensor-blending and control allocation (see page 3133, col. 2, last paragraph, lines 17–22).

12. As to claim 11, Kelkar discloses a method wherein the step of designing a passivity-based controller comprises the step of designing one of a dissipative linear-quadratic-Gaussian (LQG) type positive-real controller and a dissipative constant gain positive-real controller (see page 3136, col. 2, 1st paragraph, last 5 lines).

13. As to claim 12, Kelkar discloses a method wherein the step of rendering the compensated system positive-real by at least one of series compensation, sensor-

blending and control allocation comprises the step of rendering the compensated system positive-real by at least one of series compensation, feedback compensation (see page 3133, col. 2, last paragraph, lines 7–10), hybrid compensation, and sensor-blending and control allocation.

14. As to claim 13, Kelkar discloses a method further comprising the step of redesigning the compensation if the passivity is not preserved if mathematical model parameters are perturbed from nominal values (see "iterative controller design" in page 3136, col. 2, Concluding Remarks, lines 6–8).

15. As to claim 14, Son discloses a method further comprising the step of performing numerical simulations of the controller in the presence of a simulated broadband disturbance input to determine if the closed-loop response is satisfactory (see page 3825, col. 2, 3rd paragraph).

16. As to claim 15, Son discloses a method further comprising the step of redesigning the controller if the closed-loop response is not satisfactory (see page 3825, col. 2, 3rd paragraph).

Allowable Subject Matter

17. Claims 3–9 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter:

19. While Kelkar discloses obtaining a continuous-time multi-input multi-output (see page 3134, col. 1, 2nd paragraph, lines 10–12) state-space mathematical model (see page 3134, col. 1, 2nd paragraph, lines 1–4) of an acoustic enclosure,

Son discloses designing compensation to render the mathematical model passive in accordance with mathematical system theory if the mathematical model is not passive, thereby forming a compensated system that is passive (see page 3822, col. 2, lines 5–11) and designing a passivity-based controller such that a resulting closed-loop response provides a desired noise reduction (see page 3825, col. 2, 3rd paragraph),

Kelkar (2) discloses performing sensor blending if there are redundant sensors (see page 281, col. 1, 1st paragraph),

and Pota discloses designing a passivity-based controller that extracts at least one of acoustic energy or structural energy such that a resulting closed-loop response provides a desired noise reduction (see "The experimental results of a new robust broadband feedback controller, designed using passivity-based techniques, are presented" in page 2, Abstract, lines 5–7; "noise cancelling feedforward controller" in page 6, col. 2, section 4.1 Infinite Dimensional Controller; and "The acceleration to the medium Qa(s) and Qb(s), i.e., the acoustic energy, is provided by speakers attached to one end of the duct and the middle of the duct as shown in Fig. 2." in page 5, col. 1, 2nd paragraph and in Fig. 2),

none of these references taken either alone or in combination disclose a passivity-based controller specifically including:

claims 3–7, the expressions claimed,

claim 8, "performing sensor blending if there are redundant sensors",

claim 9, "performing control allocation if there are redundant actuators",

and claim 16, "rendering the compensated system positive-real by one of sensor-blending and control allocation",

in combination with the remaining elements and features of the claimed invention. Also, there is no motivation to combine none of these references to meet these limitations. It is for these reasons that applicant's invention defines over the prior art of record.

20. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Response to Arguments

21. Applicant's arguments filed 6/19/07 have been fully considered, but they are not persuasive.

22. Regarding the drawing objections, the amendment corrected all deficiencies and the objections are withdrawn.

23. Regarding the claim objections, the amendment corrected all deficiencies and the objections are withdrawn.

24. Regarding the rejections under 112, Applicant's arguments have been considered and the rejections are withdrawn.

25. Regarding the rejection under 103. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection. In the instant rejection, Examiner has elaborated prior art disclosures of amended claims.

Conclusion

26. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

27. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

29. Examiner would like to point out that any reference to specific figures, columns and lines should not be considered limiting in any way, the entire reference is considered to provide disclosure relating to the claimed invention.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan C. Ochoa whose telephone number is (571) 272-2625. The examiner can normally be reached on 7:30AM - 4:00 PM.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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